Space Weather Forecast

Issued on Tuesday 8 October 2024 at 13:29 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate Storms easing day 1. Chance of further X-class flares. Chance of S1 Minor Solar Radiation Storm.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High with a strong flare occurring from the complex and very active sunspot in the southwest at 07/1913 UTC. This occurred simultaneously with a long duration flare from another region just on or over the southwest limb, that also reached Strong levels. There are seven regions in total on the disc, with other regions of note including the large, mature but inactive region in the north-centre disc and two close vicinity regions in the southeast which have also remained inactive.

The Strong flares produced two CMEs (coronal mass ejections), the first directed south and west of Earth, with the second on missing due to its location on the Suns west limb. Analysis has resulted in both missing Earth, but with a slight chance of a glancing impact from the former flare associated coronal mass ejection. A large filament eruption was also seen to leave the Sun early on 08 Oct, it appears to be directed mainly south, though further analysis is necessary before a conclusion can be made of an Earth-directed component.

Solar Wind / Geomagnetic Activity: Multiple weak CME enhancements were possible in this period, perhaps including the glancing influence of the 04 Oct CME, however nothing definitive was identifiable. The onset of any fast wind also potentially occurred. Solar wind speed remained slightly elevated. Interplanetary Magnetic Field, Bt, was largely Moderate. The north-south component, Bz, favoured a negative (southward) orientation with only brief spells of positive (northward), and also varied between Weak and Moderate levels. Geomagnetic activity was mainly at G1-G2/Minor-Moderate Storm, with a two G3-Strong Storm intervals between 080000-0600 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained largely at background but rose after 07/2325 UTC due to the strong flares.

Four-Day Space Weather Forecast Summary

Solar Activity: High to Moderate activity is expected, with a chance of further strong class flares until day 3 (10 Oct). Activity then easing to be Low to Moderate but with a slight chance of strong class flares.

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Solar Wind / Geomagnetic Activity: No further Earth-directed coronal mass ejections currently feature in the forecast. However there are up to two glancing coronal mass ejections possible later in the period. The solar wind environment around Earth remains disturbed at first, due to ongoing coronal mass ejection influences and coronal hole fast winds. Solar wind speeds are likely to ease, with a slight chance of becoming slightly enhanced or enhanced for a time days 3 or 4 should any glancing coronal mass ejections impacts occur.

G1-G2 Minor to Moderate storms, with a slight chance of an isolated G3 Strong storm interval at first. However this risk will recede into day 2, with activity becoming Quiet to Active with a chance of G1 Minor Storms. Quiet to Unsettled conditions are then expected from day 3 (10 Oct), however any coronal mass ejections glancing impacts will bring a chance of further G1-G2 Minor to Moderate storms.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) responded erratically to the two strong flares from late on 07 Oct, there is a chance of S1 Minor storms occurring later day 1 or perhaps day 2 (Oct 08 or 09). There is also a chance of further enhancement given any further strong flares occur.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	30	20	20
Strong	G3	Yes	20	5	2	2
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	80	80	80	70
Very Active	R3-R5 (X Class)	Yes	30	30	30	20

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	40	40	20	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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